

WHAT IS CLAIMED IS:

1. A method for manufacturing a ferroelectric device, comprising steps of: providing an insulating substrate; forming a multi layer body depositing successively a contact film, a lower electrode, a ferroelectric film and an upper electrode on said insulating substrate; and etching said multi layer body,

wherein said etching step including:

a first etching step for etching said upper electrode and said ferroelectric film;

a heat treatment step for heat-treatment said ferroelectric film under a condition of covering said contact film with said lower electrode; and

a second etching step for etching said lower electrode and said contact film to expose said insulating substrate.

2. The method for manufacturing a ferroelectric device according to claim 1, wherein said insulating film is formed on a semiconductor substrate having a transistor, and a contact plug is formed so as to pass through said insulating film and electrically connects said transistor to said contact film.

3. The method for manufacturing a ferroelectric device according to claim 1, wherein at least a part of said lower electrode is etched in said first etching step.

4. The method for manufacturing a ferroelectric device according to claim 1, wherein said second etching step includes forming a first cover film so as to cover said upper electrode, said ferroelectric film and said lower electrode and etching said first cover film together with said multi layer body.

5. The method for manufacturing a ferroelectric device according to claim 4, wherein said first cover film, said lower electrode and said contact film are etched, in a self-alignment manner, in said second etching step.

6. The method for manufacturing a ferroelectric device according to claim 5, wherein said second etching step includes a step for forming a hard mask on said upper electrode as an etching stopper before performing the etching.

7. The method for manufacturing a ferroelectric device according to claim 4, wherein said second etching step includes forming a resist pattern on said first cover film before performing the etching.

8. The method for manufacturing a ferroelectric device according to claim 1, further comprising a step for forming a second cover film so as to cover said multi layer body after said second etching step.

9. The method for manufacturing a ferroelectric device according to claim 8, further comprising an additional heat treatment step for heat-treatment said ferroelectric film after said second cover film forming step.

10. The method for manufacturing a ferroelectric device according to claim 1, wherein said contact film includes a binding film.

11. The method for manufacturing a ferroelectric device according to claim 10, wherein said contact film further includes an oxidation barrier film.

12. The method for manufacturing a ferroelectric device according to claim 1, wherein said heat-treatment is performed to recover a crystalline structure in the ferroelectric film.

13. The method for manufacturing a ferroelectric device according to claim 9, wherein said additional heat-treatment is performed to recover a crystalline structure of the ferroelectric film.

14. A ferroelectric device comprising:

a contact film formed on an insulating film;

a lower electrode formed across said contact film;

a ferroelectric film formed on said lower electrode so as to have a smaller area than that of said contact film;

an upper electrode formed across said ferroelectric film; and

a first cover film covering side surfaces of at least said upper electrode and said ferroelectric film so as to align side surfaces of said first cover film to side surfaces of said contact film.

15. The ferroelectric devices according to claim 14, wherein said insulating film is formed on a semiconductor substrate having a transistor and a contact plug is formed so as to pass through said insulating film and electrically connects said transistor to said contact film.

16. The ferroelectric devices according to claim 14, wherein said lower electrode has a first portion contacting said contact film and a second portion contacting said ferroelectric film, and said second portion has a smaller area than that of said first portion.

17. The ferroelectric devices according to claim 14, further comprising a second cover film covering said contact film, said lower electrode, said ferroelectric film, said upper electrode and said first cover film except for a part of said upper electrode.

18. The ferroelectric devices according to claim 14, wherein said contact film includes a binding film.

19. The ferroelectric devices according to claim 18, wherein said contact film further includes an oxidation barrier film.

20. A FRAM comprising:

- a semiconductor substrate having a transistor;
- an insulating film formed on said semiconductor substrate;

- a contact plug formed in said insulating film to electrically connect to said transistor;

- a contact film formed on said insulating film to electrically connect to said contact plug;

- a lower electrode formed across said contact film;

- a ferroelectric film formed on said lower electrode so as to have a smaller area than that of said contact film;

- an upper electrode formed across said ferroelectric film ;and

- a first cover film covering side surfaces of at least said upper electrode and said ferroelectric film so as to align side surfaces of said first cover film to side surfaces of said contact film.